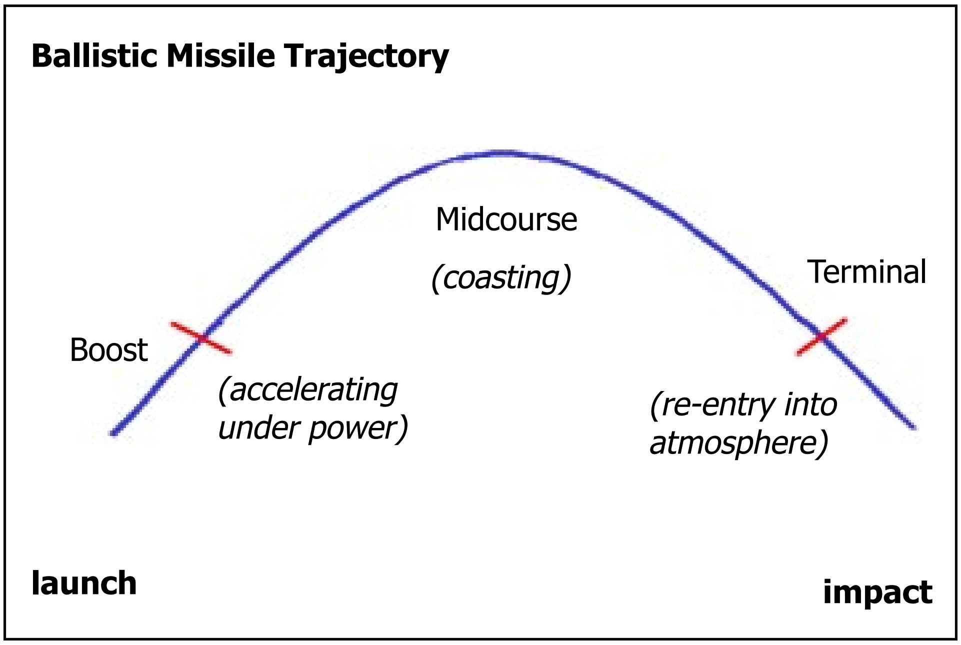
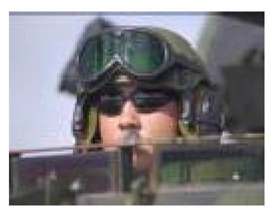
The Threat Environment

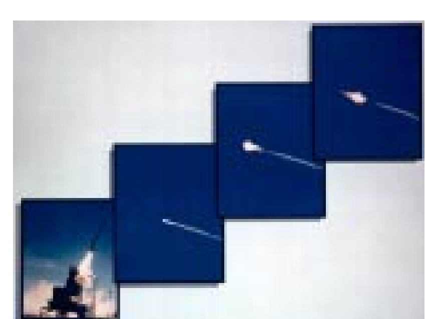


At least 25 countries now possess or are in the process of acquiring ballistic missiles. Since 1980, ballistic missiles have been used in six regional conflicts.



Since the end of the Cold War, the proliferation of ballistic missile systems and technologies, and weapons of mass destruction has increased the importance of developing and fielding a ballistic missile defense system to defend the United States, and its territories, military forces, allies and friends. The threat is real and growing. At least 25 countries now possess or are in the process of acquiring ballistic missiles. Since 1980, ballistic missiles have been used in six regional conflicts. In recent years, countries such as North Korea and Iran have tested missiles with increased range.

All ballistic missiles share a fundamental characteristic- they follow a trajectory that includes three flight phases - boost, midcourse and terminal. By fielding a layered defense system and attacking the missile in all phases of flight, we exploit opportunities that increase the advantage of missile defense systems and complicate an aggressor's plans. There are advantages and challenges in each of the flight phases. A capability to intercept a missile in the boost phase can destroy a missile regardless of its range or intended aim-point and provide a global coverage capability. A midcourse intercept capability can provide wide coverage of a region or regions, while a terminal defense reduces the protection coverage to a localized area.



The Missile Defense Program

MDA is pursuing a robust research, development, test and evaluation program.

The Missile Defense Agency's mission is to develop, test and prepare for deployment a missile defense system. Using complementary interceptors, land-, sea- air- and space-based sensors and battle management command and control systems, the planned missile defense system will be able to engage all classes and ranges of ballistic missile threats.

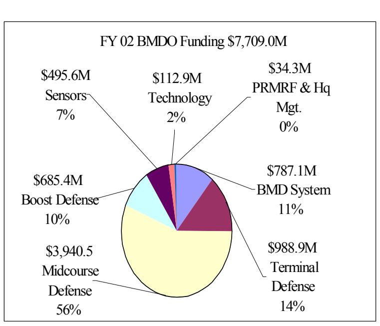
Our programmatic strategy is to develop, rigorously test and continuously evaluate production, deployment and operational alternatives for the ballistic missile defense system to provide emerging warfighting capability.

Missile defense systems being developed and tested by MDA are primarily based on hit-to-kill technology. Instead of an explosive warhead, hit-to-kill relies on a very high closing speed to collide with and destroy its target using only kinetic energy - the force of the collision to pulverize the target warhead. It has been described as hitting a bullet with a bullet – a capability that has been successfully demonstrated in test after test. Another approach is used by the Airborne Laser which uses directed energy to destroy its target.

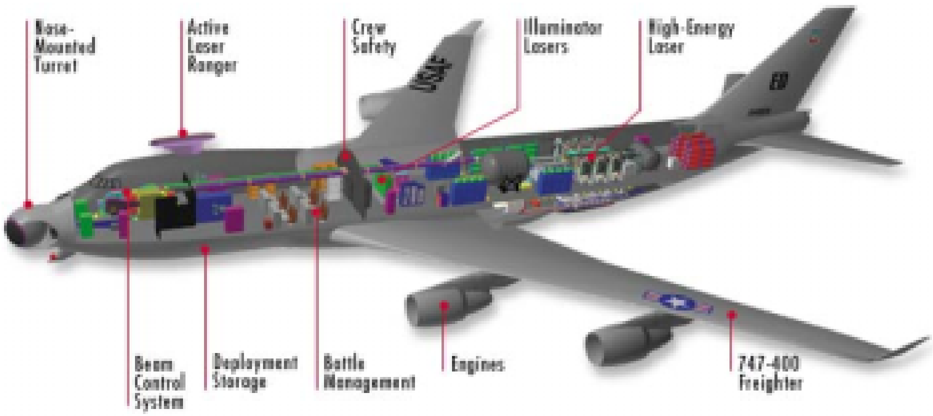
MDA is pursuing a robust research, development, test and evaluation program. We're working to put defenses into the field in two-year blocks, with successive blocks more capable than earlier ones. This will allow missile defense systems to get into the hands of our customer, the warfighter, at a faster rate than would otherwise be possible, while MDA continues future development. Deployment decisions are based on an assessment of system technology and operational effectiveness, status of threat, system cost and national security considerations. While missile defense systems, such as PAC-3 and Airborne Laser, will eventually transfer to the military services, MDA will continue developing and testing future system upgrades to proven systems, as well as, developing new ones.

In addition to interceptors, MDA is developing sensor systems that enhance our ability to detect, track and identify ballistic missile warheads from decoys. These sensors include ground-based early warning radars and satellites. They are integrated with the rest of the Ballistic Missile Defense System through a sophisticated Battle Management Command and Control network.

The agency's annual budget is approximately $7 to 8 billion. Money comes from two major funding appropriations: Research, Development, Testing and Evaluation; and Military Construction. The RDT&E budget funds all work to create new missile defense elements and improve existing capabilities.



MDA Development Activities



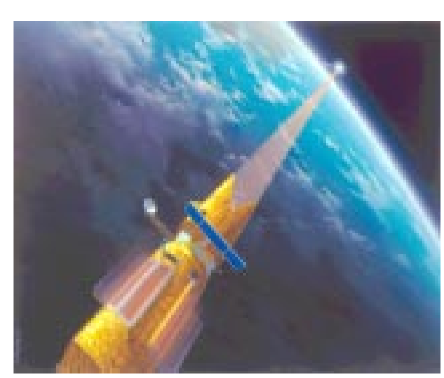
Intercepting a missile in its boost phase is the ideal solution.

Boost Phase Defense Segment

The boost phase is that part of a missile's flight path from launch until it stops accelerating under its own power. Typically the boost phase ends at altitudes of 200 kilometers or less and within the first 100 to 300 seconds of flight. During this phase, the rocket is climbing against the Earth's gravity. Intercepting a missile in its boost phase is the ideal solution. We can defend a very large area of the globe and prevent midcourse decoys from being deployed.

The Airborne Laser, or ABL, is a powerful laser aboard a modified Boeing 747 that destroys ballistic missiles by heating them until they fail structurally. The megawatt-class laser is expected to deposit lethal amounts of energy on missiles hundreds of miles from the airplane. Specialized optics and computerized equipment will spot and track the target. Corrections are made for the atmosphere, which would otherwise distort and spread the beam of light. Laser ground testing has begun and we expect the first flight tests with the laser to be conducted in FY 04.

Besides ABL, MDA is exploring other boost phase elements such space-based lasers, and sea-and space-based kinetic energy platforms.



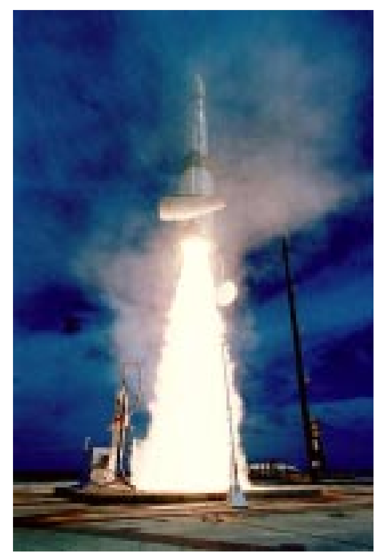
MDA Development Activities

The midcourse interceptor has a longer time to track and engage the target compared to boost and terminal interceptors.

Midcourse Defense Segment

The midcourse phase of a ballistic missile trajectory allows the largest window of opportunity to intercept an incoming missile. This is the point where the missile has stopped thrusting so it follows a more predictable glide path. The midcourse interceptor has a longer time to track and engage the target compared to boost and terminal interceptors. Also more than one interceptor could be launched to ensure a successful hit. A downside to the larger intercept window is that the attacker has an opportunity to deploy countermeasures against a defensive system. However, the interceptor also has more time to observe and discriminate countermeasures from the warhead. The Midcourse Defense Segment has ground-and sea-based elements.

Ground-Based Midcourse Defense is designed to protect the U.S. from long-range ballistic missile attacks. Integrated flight tests have tested various system components such as early warning sensors, counter-countermeasures, command and control, and interceptor missiles. The ground-based interceptor is comprised of two parts: the Booster Vehicle and Exoatmospheric Kill Vehicle. The EKV destroys its target by colliding with it at extremely high closing velocities – approximately 15,000 MPH - more than 100 miles above the earth.



The Sea-Based Midcourse Defense element builds upon the existing Navy Aegis weapons system and the Standard Missile. Flight testing involves the firing of a developmental Standard Missile 3 from an Aegis cruiser to intercept a ballistic missile target. The cruiser uses its own radar and computers to launch the interceptor. After launch, the missile's kinetic warhead acquires, tracks, and hits the ballistic missile target in space. Air defense variants of the Standard Missile are currently at sea in more than 50 Aegis cruisers and destroyers, with more than 25 additional ships in production or planned.

Missile DefenseTest Bed

Ground was broken at Fort Greely, Alaska, in June 2002 for a portion of the Missile Defense Test Bed, covering a large area of the Pacific Ocean, that will add realism to ground and sea-based midcourse testing by allowing multiple engagements and adding additional intercept areas. The test bed will include boost and terminal segment tests, which will demonstrate the viability of the layered missile defense concept. Test bed assets will provide limited contingency capabilities. The test bed is expected to begin testing operations in 2004.

MDA Development Activities

Terminal Defense Segment

A missile enters the terminal phase when the warhead falls back into the atmosphere. This phase generally lasts less than a minute. The two primary elements are the PATRIOT Advanced Capability 3, commonly referred to as the PAC-3, and THAAD, Theater High Altitude Area Defense. Except for some radar elements, both of these systems will be transportable to anywhere in the world via military transport aircraft

The PAC-3 missile is a high velocity, hit-to-kill interceptor developed to provide increased defense capability against short-range ballistic missiles, cruise missiles, and aircraft. Unlike earlier versions of the PATRIOT missile, which use an explosive warhead to destroy its target, the PAC-3 missile collides with its target in mid-air at extremely high speed, destroying the target and neutralizing its payload. Other system upgrades include: improved radar performance allowing enhanced target discrimination; and new system software that improves determination of target launch and impact points and provides an interface with THAAD. Once operational testing and evaluation is complete, the PAC-3 is expected to be the first system to transfer to a military service from MDA.

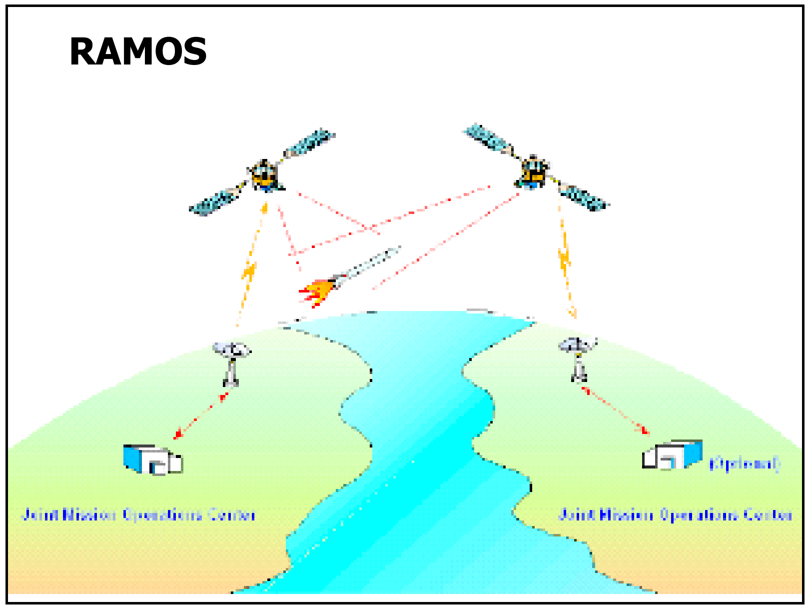
THAAD is ground-based and capable of engaging short-and medium-range ballistic missiles – both inside and outside the Earth's atmosphere. By being able to destroy missiles outside the atmosphere, THAAD will give U.S. forces an opportunity to destroy incoming warheads at a distance that will minimize the likelihood of debris falling on our troops or population centers – an important consideration if an incoming missile carries nuclear, biological or chemical warheads. THAAD consists of truck-mounted launchers, hit-to-kill interceptors, radar components and THAAD Battle Management Command and Control (BM/C2) network. After two successful test intercepts in 1999, THAAD flight-testing is expected to resume in 2004 or 2005 and initial fielding is expected in 2007 or 2008.

The THAAD Logistics Team is a winner of DoD's Packard Award for developing several innovative logistics concepts that will potentially reduce operation and support costs throughout THAADs service life. By applying "pit-stop technology" from the automotive racing industry, maintenance diagnostics and repair times were reduced from minutes to seconds. They also leveraged technologies that will reduce its transportation footprint and enable it to deploy with fewer airlift assets.

A missile enters the terminal phase when the warhead falls back into the atmosphere.

International Activities

MEADS is a highly mobile ground-based terminal defense system that will be able to engage theater ballistic missiles, large-caliber rockets, cruise missiles and aircraft.



Arrow is a joint effort between the U.S. and Israel to develop, test and field a ballistic missile defense system to defend Israel and U.S. Forces deployed in the region from short to medium-range ballistic missile threats. The system has been operational in Israel since 2000 and consists of two deployed missile batteries. The Arrow Deployability Program supports testing, interoperability with U.S. missile defense systems and funding for a third Arrow Battery.

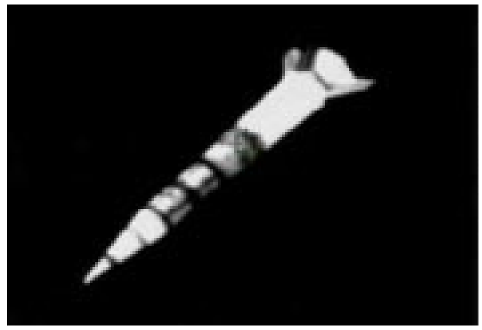
The Medium Extended Air Defense System, MEADS, is a co-developmental program involving the U.S., Germany and Italy. It is a highly mobile ground-based terminal defense system that will be able to engage theater ballistic missiles, large-caliber rockets, cruise missiles and aircraft. Current plans involve using the PAC-3 interceptor and it will provide 360 degrees of protection for joint maneuver forces.

Additionallly, Japan is helping research and develop sea-based interceptor technologies and the United States has an agreement with Russia for RAMOS, the Russian American Observation Satellite.

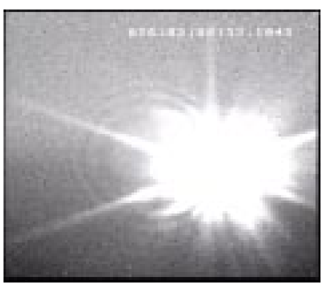
Technology

Targets and Countermeasures

MDA develops targets and countermeasures required for testing the Ballistic Missile Defense System and its associated elements. This is important because these targets and countermeasures provide a realistic threat challenge to the evolving layered missile defense system. The national laboratories provide expertise in the development and integration of countermeasures and payloads to accurately represents potential threats. Several targets use retired components from the Pershing II, Polaris, and Minuteman programs, as well as some foreign missile acquisitions. Since its inception in 1993, the program has launched more than 100 targets and operates with a cumulative success rate of 95 percent.



View of the target from the interceptor

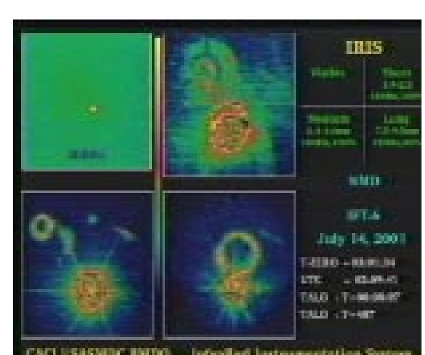


Target Intercept

Defense and commercial technology transfer is a win-win situation.

Technology Applications

Advanced technology is the key to an effective missile defense system. MDA funds the development of advanced technology to strengthen our nation's missile defenses. While MDA technology development is intended for defense needs, much of what is developed also has commercial use applications in the biomedical, environmental, automotive, computers and networking, consumer goods, manufacturing and aerospace fields. MDA is fostering strong ties with the commericial sector. Defense and commercial technology transfer is a win-win situation. Private industry can gain new customers with new products. Commercialization helps MDA by further improving technologies for missile defense applications. Focal plane arrays, chip-stacking technology for infrared seekers and composite materials are some examples of technology spun off into commercial markets and then back into the missile defense system. Private industry often comes up with new techniques for manufacturing that MDA can leverage to significantly lower costs.

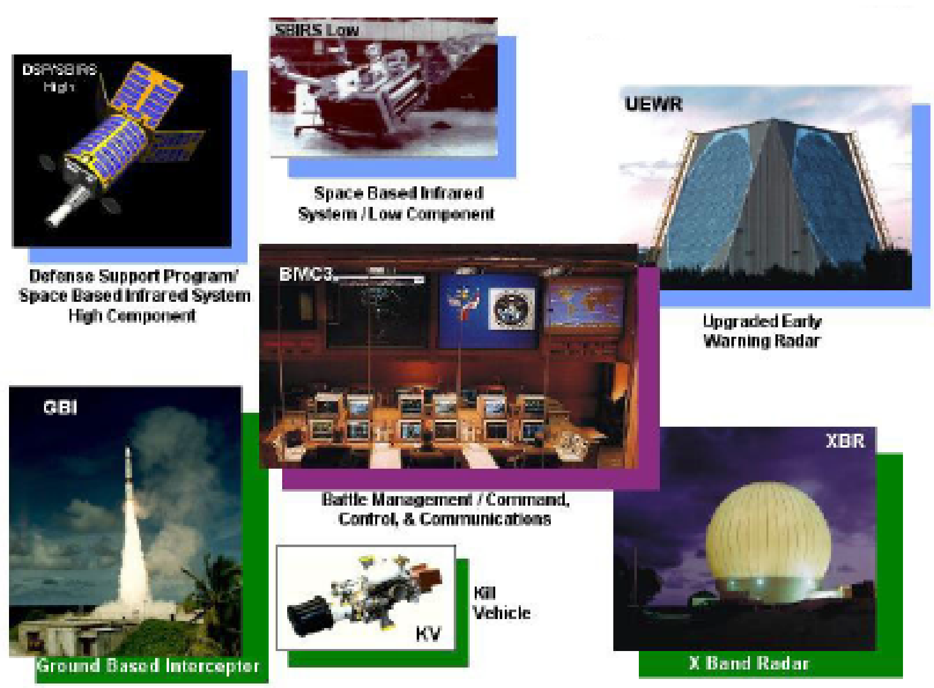


Missile Defense National Team

The solution was to forge a closer government and industry relationship – the National Team.

The National Team

In many ways, MDA's relationship with industry is more complex than its relationship with the military services. To find the right solution, MDA looked at the management of a number of diverse and pioneering efforts including: the Manhattan Project; NASA's Mercury, Apollo and Space Shuttle programs; and U.S. ICBM programs. What became clear is that the government often didn't have a detailed enough understanding of what to buy or what industry could offer. The solution was to forge a closer government and industry relationship – the National Team. This management approach will provide significant value-added to the missile defense system by bringing together the best and brightest from government, academia and industry.



GMD System Elements

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